DOCUMENT RESUME

ED 353 440 CE 062 869

AUTHOR Dyrenfurth, Michael
TITLE Internationalizing Technology Education.
PUB DATE Nov 92
NOTE 23p.; Paper presented at the Mississippi Valley Conference (Chicago, IL, November 12-13, 1992).
PUB TYPE Speeches/Conference Papers (150) -- Information Analyses (070)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Faculty; College Programs; *Educational Needs; Elementary Secondary Education; *Global Approach; Higher Education; International Cooperation; *International Educational Exchange; *International Programs; Postsecondary Education; Professional Associations; Student Organizations; *Technological Advancement; Technological Literacy; *Technology Education

ABSTRACT

Internationalizing is not a predominant theme in technology education either in the United States or in Europe. However, the case for internationalizing education and technology education is compelling, especially since the goal of promoting genuine understanding and tolerance is accepted. Four major purposes or themes for internationalization include analysis of the world as a series of interrelated systems, perspectives on the development of modern civilization, cultural understanding, and preparation of citizens to make public policy. Respect for diversity and the concept of sustainable development might well be added to the preceding themes. The essence of internationalization is collaboration, not competition. Based on a literature review, research, and personal experience, a sample list of possibilities can be suggested for evolving a plan for internationalization of technology education. These suggestions fall into the following categories: practice (teaching of technology education in elementary and secondary schools), research, student association activity, graduate education and university faculty, professional association activity, school administration and state departments, and university administration. The key to progress towards internationalization is systematic planning and support of multiple points of contact across the entire faculty, student, and administrator body. Frequent and extended contact are also critical features. (The paper lists 67 references and 41 associations and 18 agencies operating in the internationalization arena.) (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED353440

Internationalizing Technology Education

Michael Dyrenfurth
Industrial Education
Department of PAVTE
University of Missouri-Columbia

Mississippi Valley Conference
Chicago, November 12-13,1992

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

M J Dyrenfurth

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

CE 062 469

© Michael Dyrenfurth, 1992

Internationalizing Technology Education: An exploration of the possibilities

The context for internationalization

Today, we give much lip service to the notion that many aspects of our society are increasingly international in nature. The globalization of national economies, information systems and corporate competition are widely recognized. Not surprisingly, our own profession, education in this case, has called for an increasing level of internationalization. Similarly, it is not hard to find technology education leaders who call for a similar thrust in our own part of the larger profession. The bad news, however, is that by and large, we must conclude that the bulk of this is lip service. Frankly, when examining our profession, unbiased observers will be forced to conclude that we do far more talking about than actually internationalizing our programs.

The following points should provide evidence supporting the above conclusion. These points are intended as representative samples of the state of our, i.e., technology education, profession. Note that the intent is merely to document a pervasive condition in our profession, not to assign blame.

- The ITEA and the TED are not truly international nor are most of our other professional associations in technology education. E.g., there is no effective way for an international practitioner to hold major office; we have not held our conferences overseas; international professionals are not routinely represented on our journals' editorial boards, and international/global education very rarely surfaces in our publication lists.
- The mainstream thinking of our profession is not yet international, witness the absence of internationalization in the CTTE monograph on graduate education (Wright, 1991). Nor is our nation alone in this. The EGTB (n.d.), and UNESCO as evidenced in Morris (1986), both genuinely international groups, speak much more of sharing ideas across nations rather than infusing a systematic internationalization thrust into and throughout the curriculum. Nor do our research thrusts generally propose international dimensions, e.g., Waetjen's (1989) proposal for a problem-solving research project. Similarly, one of our field's basics, Colelli's (1989) *Technology education-A primer*, does not mention internationalization—an omission also perpetrated by Barnette (1990). Barnette's dissertation did not identify internationalization or globalization as one of the 24 key concepts defining technological literacy nor did Householder & Boser's (1990) program assessment model. Neither does the Holmes group (n.d.) allude to internationalization in their document *Tomorrow's schools*....

  Internationalizing is simply not a predominant theme in technology education either here or overseas, e.g. ITEA publications list, *TVEI Developments* , the technology education demonstration projects as described in Wicklein et al.'s

(1991) article. The CTTE's *Undergraduate teacher education* monograph and ITEA's *A perspective on implementation*, seem therefore to be just token example.

- The Ontario Premier's Council (1990) did what so many do, i.e. they drew on practices of Europe and Japan to build our comparative advantage, but in doing so, they missed the point of internationalization by not ingraining cooperation and globalization.
- Against this backdrop, and compounding the problem, is the coalescing of numerous major supra-national economic/political regional factions. These include the European, American/Canadian, Chinese/Japanese/Pacific, Indian/Pakistani, Australia/New Zealand/Pacific, African, and Central & South American structures. Adding even more pressure is that we get very little international news in America, and that which does filter through is relatively distorted.

The case for internationalization

Not withstanding the previous section, the case for internationalizing education and technology education is compelling. It has been presented most cogently by Lauda (1992) in addressing the International Conference on Technology Education in Weimar, Germany. Essentially the reasons tend to be either altruistic, or competition oriented. Such efforts serve to address the challenge of students being *internationally undernourished* (Lauda, 1992) and their goal is to promote genuine understanding and tolerance. Additionally, of increasing importance is the comparability and portability of worker qualifications. The OECD has characterized much of the force towards internationalization as techno-globalism

Purpose

Given our profession's sincere interest in internationalizing, my intent in this paper is to present a rubric to guide our efforts in internationalizing. Additionally, I will present an exploration of selected possibilities for activities. Then, appended to this paper is a set of resources that should prove helpful to members who wish to pursue matters in this vein.

One caveat is important. Since the international sphere of activity is so vast, we need to be very humble and know that one doesn't know. For example, I've been to 15 countries yet **I know that I know less and less** each time I travel to a new country—there is just so much to know—and even more to understand!

What is Technology Education

Technology education is the place where the rubber meets the road. It is not theory, an abstraction or rhetoric. It is real. As such it consists of **practice** at all levels of education, from K-12, and beyond into post secondary and university levels. It also includes the research conducted to improve the profession and to chart new directions for it. Additionally, it includes the developmental initiatives of all

engaged in delivering it, i.e., the inservice and professional development of its practitioners. Be careful to note that it exists as a **continuum** of programs, both in and outside of the school. The combined practice field is depicted in Figure 1.

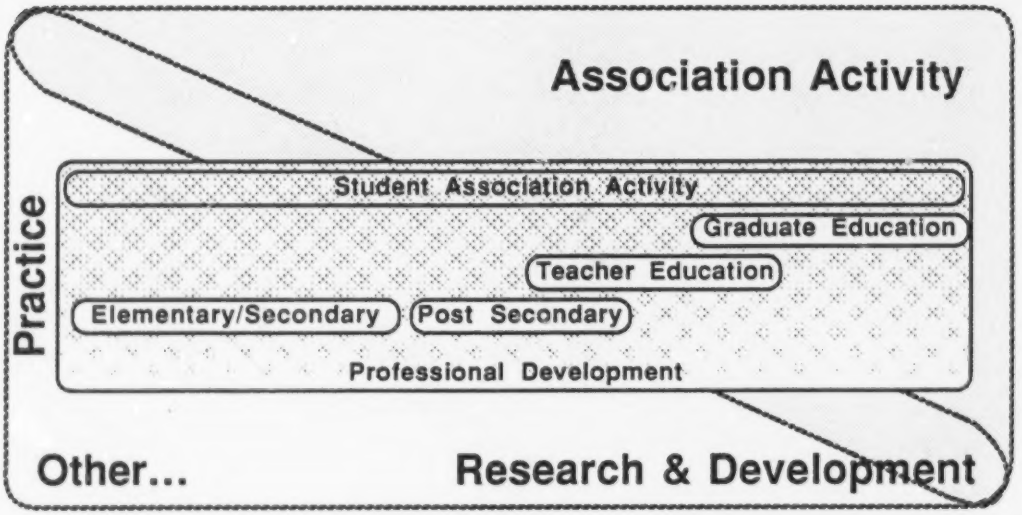


Figure 1. Graphic representation of technology education's practice field

Nature of internationalization

Internationalization is our response to the increasing globalization of perspective and practice that we observe in the world. Lauda (1992) cites four major purposes or themes for internationalization:

> *The Study Commission on Global Education (1987) in the United States identified four basic themes for global education. While these were written for U.S. educators and all disciplines, they offer "food for thought" for those engaged in technology education in all nations (Kerr, 1987, pp. 17-22). Most assuredly they offer unique opportunities for helping students internalize concepts such as "limits," "mutual causality," "interdependence," "equilibrium," "systems," and "irreversibility" which seem to be conspicuously absent in our content base. The four basic themes were:*
>
> 1. *Analyses of the world as a series of interrelated systems (physical, biological, economic, political, communication and evaluative). A unique opportunity is provided for infusing concepts and information on such topics as global production systems, finite resources/infinite demands, resource distribution, ecological issues, the information age, technology assessment, etc.*
> 2. *Perspectives on the development of modern civilization. The study of technology has a temporal dimension, a history which has altered human history. The development and implementation of technologies which developed world-wide make a rich resource for content derivation.*

3. *Cultural understanding. Technology, as a primary determinant of culture, must be explored in terms of its reason for existence and its impact on the humans, the natural environment and our basic institutions.*

4. *Preparation of citizens to make public policy. Students need to recognize technological problems/opportunities and achieve the ability to resolve/utilize them in a technological environment. Today's technological society mandates the ability to identify problems, unravel complexities and find connections and assume responsibility for a global social consciousness.*

Respect for diversity might well be added to the preceding themes as well as the concept of sustainable development. The latter leads directly to the concept of appropriate technology which Budgett-Meakin (1990) explains with "'sustainable development' as defined in the Brundtland report (1981) cited development that meets the needs of the present without compromising the ability of future generations to meet their needs"

In addressing these themes, we typically seek to develop faculty and student understanding of and capability with a set of key concepts which are central to internationalization:

Lauda (19920
Limits
Mutual causality
Interdependence
Equilibrium
Systems
Irreversibility

Dyrenfurth
Geographic literacy
Parallel between internal and external perspective

Ballisteri
Types of impacts
-environmental
-technical
-financial
-social
Technology assessment
How and why technology has had an impact on people's lives

O'Neil (1989)
The study of human values
The study of global systems
The study of global problems & issues
The study of the history of contacts and interdependence among, peoples, cultures and nations

Pytlik et al. (1991)
Irreversibility of technological change
Interaction between technology, society and culture
Technology and world awareness
Technology and individual decisions

Maley
Competitiveness and collaboration
Peacekeeping and war
Governmental operation
Communication
Financial data systems
Commerce
Technology education as life long education
Civic procedures

Five common objectives from the European ministers of education statement, *Conclusions on cooperation and community policy in the field of education in the run-up to 1993*. They characterize much of the intent driving globalization around the world with:

1. *A multicultural Europe*
   - *strengthening young people's sense of belonging to a European community by developing the European dimension in teaching and teacher training*
   - *the progressive achievement of genuine multilingualism by promoting foreign language teaching in school, university and vocational training systems*
   - *taking the variety of cultural approaches into account in education and training systems*
   - *drawing educational and training establishments closer together*
2. *A mobile Europe*
   - *the free movement of persons and ideas, in particular systems for the recognition of diplomas and for establishing the comparability of vocational training qualifications*
   - *support for youth exchanges and for training periods abroad for teachers, instructors, pupils, students, and education administrators,*
   - *the introduction of procedures providing teachers with the opportunity to teach temporarily in educational establishments of other Community Member States.*
3. ... *(CEDEFOP News 1989, December #5, p. 2)*

Given the preceding, it is clear that a person's capacity to secure and internalize international perspectives is enhanced if he/she possesses a significant language capability. This capability contributes so much to understanding and sensitivities, that we in the technology education profession must address ourselves to ways by which we can encourage development of our personal, and that of our colleagues' and students', foreign language capability.

It is also useful to spend some time thinking about what internationalization is not. For example, comparative education is not internationalization! Indeed, the latter is not any single activity or perspective. That would be to hope for a "bandaid" that could be easily applied and soon forgotten. Internationalization is not the enhancing of our nation's position relative to other nations on comparative tests as described by Bracey (1992, October). Furthermore, given the altruism vested in the movement's key concepts, it does not ring true to base our arguments for internationalization on our decreased competitiveness. The very essence of internationalization is collaboration **not** competition.

Internationalization, in the mindset of those who champion it, is a "through to the bone" systemic change in individual and group perspective. It is based on understanding and mastery of some key concepts and their routine application—not

just when someone is looking or when we encounter a "foreigner". Internationalization is more than just knowing about other nations and regions instead it seeks to help students "understand, and deal with the connections and ties that today link individuals and peoples the world over" (Becker, cited by O'Niel, 1989, p. 2).

Implications for implementation

It is clear that much will have to be done to implement a viable program of internationalization of technology education. Lauda (1992) has suggested drafting an "action plan" to better organize how we accomplish the task of internationalization. Based on a literature review, research and personal experience, the author has compiled a sample list of possible actions that may prove useful in evolving such a plan. The possibilities are categorized according to the model provided by Figure 1's in depiction of the practice of the profession. As such, the main categories of suggestions are:

- Practice, i.e. teaching of technology education in elementary & secondary schools
- Research
- Student association activity
- Graduate education and university faculty
- Professional association activity
- School administration and state departments
- University administration

Practice at elementary, secondary & post secondary levels

- participate in international students exchange programs
- incorporation of internationalization concepts into the curriculum as well as geography and economic components
- infuse international studies perspective into basic social studies courses, history, political science, geography. (Holderman, 1983)
- participate in international teacher exchange programs
- communication with sister classes in international settings
- engage in international space simulations, joint production, competitions, joint design, student association work
- enhance the language facility of teachers and students
- capitalize on community resources appropriate to internationalization, e.g., corporations doing business abroad
- have students apply international concepts to local situations
- share resources on a global basis (i.e., content, instructional (strategies) using new communication systems, e.g., INTERNET, FIDONET
- capitalize on foreign students/faculty and/or discipline strengths, e.g., German pedagogics & didactics, Dutch primary technology education

experience, British design and problem solving, African appropriate technology.

- extend personal invitations to foreign colleagues to visit, work, vacation, tour or whatever.
- offer to help international student and/or faculty exchange agencies with local arrangements. Examples of such agencies include student exchange programs, Rotary and other service clubs, etc.
- when foreign visitors tour your site, have them make a presentation and videotape it for future use.
- participate in international corporate linkage/training programs

Research

- engage in international co-authorship of technology education materials.
- engage in research activities conducted jointly by educators from two or more countries. Perhaps our field's best examples of collaborative research is the PATT research. Although it is somewhat limited in concept, it is an exceptionally useful example and it was/is genuinely valuable in bringing brought the people together. Fruitful/promising areas for future collaborative research might be assessment, problem-solving, didactics and foundation/theory building.
- compare the differences in impact of a technology in varying cultures
- incorporate international information sources in reviews of the literature
- insure that key international research journals are in library and require graduate students to review them
- participate in the international round table of scholars of technology education
- systematically infuse international information by subscribing to foreign journals in the categories of general information, technical and professional journals
- develop cultural/education analyses/comparisons across countries of interest, e.g.:
  - comparing the objectives of technology and vocational/technical education
  - comparing evaluative criteria used to judge programs
  - analyzing the flow of students from education system component to component

Student association

- interface TSA, TECA and/or local association chapters to overseas student associations
- invite exchange teams of association officers to participate in chapter or association activities
- share international linkages with other associations

- develop packet to help visitors understand our operation and field of action

Graduate education & university faculty

- audit your program from the perspective of an international student. Conduct a follow-up evaluation targeted on identifying your international students' assessment of their experience. Include internationalization questions in addition to program evaluation ones.
- conduct special international student advisement sessions for those enrolled in your programs. Give them a chance to talk out their feelings. Recognize the cultural differences that affect interaction patterns.
- consult with international development corporations, e.g., Bechtel, Daniels, ITECO, Westinghouse, RCA, General Electric, Academy for Educational Development, etc. Recognize that this is typically a long-term exercise, that it requires much up front investment and that the players change rapidly.
- look for bilateral and country specific agencies such as the German Marshal Fund, The GTZ, etc. I have found that the consulate's educational attaché is often very helpful in identifying these.
- participate in delivering papers at overseas conferences and then take an active part in their conferences.
- prepare recruitment and program information materials targeted especially on international students and their special needs for information and security.
- serve as foreign student association advisor
- serve, remotely and in person, on external doctoral committees for overseas students.
- serve on institutional international education committees
- plan and conduct **study** (course-based and credit granting) tours to foreign countries. Perhaps these are more likely to succeed when serving a consortium of universities and a larger region. Arrange for reciprocal credit to encourage enrollment.
- setup personal foreign study tours. Careful preparation and research is essential here. Plan to incorporate visits to key international and national agencies, e.g., UNESCO, ILO, OECD, and while there be sure to scan their libraries and publication arms. Similarly, get the UNESCO overview of each country 's education system and then visit local schools/universities and their administrative agencies as appropriate.
- establish student and faculty exchanges with specific goals in mind to advance international perspectives.
- incorporate parts of the non-taught (research only) Ph.D. degree
- consider the practice of inviting an external examiner from overseas
- capitalize on international graduate students to build a bank of resources and understanding, e.g., have graduate students with language capability translate foreign articles

- conduct seminars/professional development activities promoting international linkage via BITNET, INTERNET, JANET etc.
- permit a "semester abroad" as part of the degree program
- teach classes abroad
- establish contacts with educational attaches of nearest embassies
- remember that the faculty's personal interaction is the key to promotion of significant international contact and understanding
- develop a departmental and/or institutional international capability statement
- include international activity as a section in each faculty resume and annual evaluation procedure
- note that an infusion of internationalization concepts across much of the curriculum is necessary. However, this is not sufficient. Particularly for graduate school, it would seem wise to offer a special course focusing on international aspects of our profession and on the internationalization of our thinking.. Note that this too is not sufficient. Indeed, both approaches must be employed for maximum effect.

Association activity

- jointly plan a conference between two or more associations, e.g., ITEA, TED and EGTB or between a local/state association and its sister state or city association.
- develop a "mission statement" committing educators from all nations to internationalization of the curriculum.
- work to make our associations, e.g., the ITEA and TED more genuinely international
- provide support to help other associations develop programs of work
- exchange officer teams
- create visitor association slots in our conferences
- provide for conference participation and association membership by professionals from countries without currency conversion capability
- facilitate international journal exchange. Seed key associations, libraries and people with subscriptions
- de-emphasize the competitiveness rationale from our promotional statements
- create an international column in our journals
- carry articles in other languages, with English abstracts, or invite translation and recognize contribution of translators
- strengthen the internationalization component of the CTTE standards
- formally join world wide networks such as WOCATE and ICASE

School administration & state departments

- establish communication channels for administrators, teachers, and students, e.g., satellite linkage
- develop an international capability statement that outlines what your department and institution's strengths are with respect to international activity.
- evolve bilateral reciprocity and/or development programs with specific institutions overseas. Be creative, for example UMC is involved in one that has us serve as a professional development/graduate education site for Chinese faculty from a specific university and in turn, they serve to provide Chinese language training sites for our students (not in our department).
- schedule foreign faculty to teach a regular course in your program.
- pool satellite uplink/downlink access via participation in consortia, e.g., the Missouri School Boards Association's Educational Satellite Network, the Star Schools Program, etc.
- establish subscriptions to international and foreign journals
- have librarians secure international and foreign resources and feature them in a special section in the library
- develop a plan to capture/tap into the international people in your community
- link the various curriculum development centers internationally

University administration

- recognizing that costs need to be controlled everywhere, conduct faculty development seminars on how to use E-mail to take advantage of efficient and low or no cost communication. Establish how one can access the networks, e.g., BITNET, INTERNET, FIDONET, JANET overseas in the countries you are most interested in.
- use the experimental program provision of state teacher certification rules to promote reciprocal certification. Infuse foreign approaches to pedagogics/didactics, language facility development (French, Spanish, German, Russian, Japanese, ...), and comparative education into experimental teacher education programs
- establish international internship opportunities
- rethink travel policies, e.g., negotiate bulk travel with airlines
- establish housing capabilities for international visitors by capitalizing on surplus dorm space
- require an international component in all degree programs
- suspiciously guard against any central "international" office becoming too powerful. The object is to encourage multiple diverse and ubiquitous strengths through the faculty, not a few well-traveled, well-meaning administrators.

- establish an international contacts and linkage database accessible to all
- involve international faculty in professional development efforts
- match faculty personal investment in international travel
- capture university-paid travel frequent flyer miles on all 100% covered trips of all administrators and faculty
- consider translation the equivalent of co-authoring an article in faculty assessment procedures
- restructure sabbatical programs to encourage international contact

Summary

The key to progress towards internationalization is systematic planning and support of multiple points of contact across the entire faculty/student/administrator body. Frequency and repeated contact are also critical features as is extended contact. These characteristics tend to mitigate against shallow, pseudo-understandings. A collaborative planning effort involving international participants would seem desirable so that the entire thrust is launched in a way that models the desired behavior. The generation of a possibilities/goals matrix could well form the initial activity of such a planning effort.

Ultimately, however, the dream of internationalization is realized in the individual and collective mindsets of faculty, students, researchers and administrators. It is this liberalization of what tends to be a strongly ethnocentric perspective that must be nurtured. It will be a long-term task and one that requires ongoing commitment by all. We must incorporate a sustainable reform to enable us all to live together in our global village.

References & Resources

Archer, E. G., & Peck, B. T. (1991). *The teaching profession in Europe*. Glasgow, Scotland, UK: Jordanhill College of Education. ERIC Document Reproduction Service No. ED 344 885.

Assani, S. P. (1989). *How can the teaching of woodwork and science at secondary school level be integrated?* Sweden: Linkoping University, Department of Education and Psychology. ERIC Document Reproduction Service No. ED 312 425.

Barnes, J. L. (1987). *An international study of curricular organizers for the study of technology*. Doctoral dissertation. Blacksburg, VA: Virginia Polytechnic Institute and State University.

Barnette, E. J. (1990). *The identification of the major concepts that define technological literacy for precollege education*. Doctoral dissertation. Raleigh, NC: North Carolina State University.

Blandow, D. & Dyrenfurth, M. (Eds.). (1992). *Who's Where in Technology Education: An international database.* Columbia, MO: Applied Expertise Associates.

Blandow, D. & Dyrenfurth, M. (Eds.). (1992). *Technological literacy, competence and innovation in human resource development.* Proceedings of the First International Conference on Technology Education. Sponsor: Technical Foundation of America. Weimar, Germany: Thüringer Algemeine.

Bracey, G. W. (1992). The Second Bracey Report on the condition of public education. *Phi Delta Kappan, 74*(2), 104-117.

Budgett-Meakin, C. (1990). A global approach to design and technology. In J. Smith (Ed.), *Third National Conference Design and Technology Educational Research and Curriculum Development.* Conference proceedings, September 13-15, 1990, Loughborough, UK: Department of Design and Technology, Loughborough University of Technology.

CEDEFOP. (1989). Promotion of cooperation among research and development organizations in the field of vocational training. Working meeting papers: 13 and 14 September 1988 and 3 to 5 July 1989. Berlin, Germany: Author.

CEDEFOP. (Periodically). *CEDEFOP flash.* European Center for the Development of Vocational Training, Bundesallee 22, D-1000 Berlin 15, Germany.

CEDEFOP. (1989, December). *CEDEFOP News.* [Bernd Möhlmann, Editor, European Center for the Development of Vocational Training, Bundesallee 22, D-1000 Berlin 15, Germany].

CEDEFOP. (Two issues yearly). *Vocational Training.* European Center for the Development of Vocational Training, Bundesallee 22, D-1000 Berlin 15, Germany. ISSN 0378-5068

Chang, F. T. J. (1991). *The impact of the 1950s' Sino-American industrial vocational education cooperative project on the current technical vocational education in the Republic of China.* Paper presented at the American Vocational Association Convention, Los Angeles, CA, December 6-10, 1991. Taiwan, Republic of China. ERIC Document Reproduction Service No. ED 339 827.

Cohen, A. M. (1991). *International counterparts of the American community college.* Los Angeles, CA: Center for the Study of Community Colleges. ERIC Document Reproduction Service No. ED 339 427.

Colelli, L. A. (1989). *Technology education: A primer.* Reston, VA: International Technology Education Association. ERIC Document Reproduction Service No. ED 336 637.

Commission of the European Communities. (Periodically). *EuroTecNet,* Maastricht: European Centre for Work and Society.

Commonwealth Association of Science, Technology and Mathematics Educators. (Three issues annually). *CASTME Journal,* [Sam Bajah, Secretary, Commonwealth Secretariat, Marlborough House, Pall Mall, London SW1Y 5XH, United Kingdom].

The Design and Technology Association. (Bimonthly). *DATANEWS*. [The Design and Technology Association, 16 Wellesbourne House, Walton Road, Wellesbourne, Warwickshire CV35 JB, United Kingdom].

The Design and Technology Association. (Three issues annually). *International Journal of Technology and Design Education*. [John Heywood, Editor, Department of Teacher Education, Trinity College, University of Dublin, Dublin 2, Ireland].

The Design and Technology Association. (three issues annually). *Design & Technology Teaching*. Chester: Bemrose Press Limited. [Barbara Wiggins, Business Manager, Trentham Books Limited, Unit 13/14, Trent Trading Park, Botteslow Street, Stoke-on-Trent ST1 3OY].

Dyrenfurth, M. (1987). *International perspectives on technological literacy*. Presentation at the International Symposium on Technological Literacy, The Ohio State University, May 1987, Columbus, Ohio.

Ellis, J. D. (1992, August). *Constructing sustainable reform in science and technology education*. Paper presented at the NATO Advanced Study Institute, Advanced Educational Technology in Technology Education, University of Salford, Salford, UK.

European Society for Technology Education (EGTB). (n.d.). *Technology as part of education*. Düsseldorf, Germany: Author.

The Ford Foundation. (Quarterly). *REPORT*, [The Ford Foundation, Office of Communications, 320 East 43rd Street, NY, NY 10017, Lloyd Garrison, Editor, ISSN: 0015-699x].

Halls, W. D. (Ed.). (1990). *Comparative education: Contemporary issues and trends*. Paris, France: UNESCO/Jessica Kingsley Publishers , IBE. ISBN 92-3-102564-3,

Heidemann, W. (1991). Qualification and the internal European market. *European Education*, 23(2), 32-46. ERIC Document Reproduction Service No. EJ 442 159.

Henak, R. (Ed.). (1991). *Elements and structure for a model undergraduate technology teacher education program* CTTE Monograph No. 11. Reston, VA: Council on Technology Teacher Education.

Holderman, J. B. (Chairman) (1983). *Critical needs in international education: Recommendations for action*. Report of the National Advisory Board on International Education Programs to the Secretary of Education. Washington, DC: US Department of Education.

The Holmes Group. (n.d.). *Tomorrow's schools: Principles for the design of professional development schools*. Executive Summary. A report of the Holmes Group. East Lansing, MI: Author.

Householder, D. L., & Boser, R. A. (1990). *Development of criteria and procedures for assessing the effectiveness of the change to technology teacher education programs*. Texas: Council for Technology Teacher Education. ERIC Document Reproduction Service No. ED 323 333.

Huberman, M. (1992). *Linking the practitioner and researcher communities for school improvement*. Keynote address at the International Congress for School Effectiveness and Improvement, Victoria, British Columbia, Canada. ERIC Document Reproduction Service No. ED 353 203.

International Council of Associations for Science Education. (Quarterly). *Science Education International*. [Brenton Honeyman, Editor, The ICASE Journal, 10 Hawken Street, Monash ACT 2904, Australia].

International Labor Office. (1987). *Essential publications for technical co-operation*. Annual catalog. Washington, DC: Author.

International Organization for Science and Technology Education. (1991). *Science and technology education: Responsible change for the 21st century*. Sixth international symposium on world trends in science and technology education, August 12-21, 1991, Palm Springs, CA.

International Technology Education Association. (1988). *Technology: A national imperative*. Reston, VA: Author. ERIC Document Reproduction Service No. ED 302 665.

International Technology Education Association. (1985). *Technology education: A perspective on implementation*. Reston, VA: Author. ERIC Document Reproduction Service No. ED 305 506.

International Vocational Education and Training Association. (1989). *IVETA Newsletter, 5*(2), 1-10. Vancouver, B.C., Canada: Author. [Marvin Lamoureux, 250 West Pender Street, Vancouver, B.C., Canada].

Khaleel, I. A. (1991, October). International perspectives on technology transfer and its impact on the development of democratic ideals. In P. H. Wright (Ed.), *Technological impacts: Social, environmental, economic, ethical*. Proceedings of Technology Education Symposium XIII, Terre Haute, IN: Indiana State University, Industrial Technology Education Department.

Lauda, D. P. (1992). Internationalizing the curriculum in technology education. Paper presented at INCOTE-92, Weimar, Germany, April 25-30, 1992. In Blandow, D. & Dyrenfurth, M. (Eds.). *Technological literacy, competence and innovation in human resource development*. Proceedings of the First International Conference on Technology Education. Sponsor: Technical Foundation of America. Weimar, Germany: Thüringer Algemeine.

Layton, D. (Ed.). (Periodically). *Innovations in science and technology education*, Vol. III. Paris, France: UNESCO, ISBN 92-3-102664-X.

Manpower Services Commission. (1986). *TVEI Developments*. Windsor, Berkshire, UK: Nfer-Nelson.

Morris, R. (Ed.). (1986). *The place of science and technology in school curricula: A global survey*. Paris, France: UNESCO

Mottier, I., Raat, J. H., de Vries, M. J. (1991). *Technology education and industry.* PATT 5 Conference 1991 Volume 1 Report. Eindhoven, Netherlands: PATT-Foundation. [PATT Foundation, Marc J. de Vries, Pedagogical Technological College, P. O. Box 826, 5600 AV Eindhoven, The Netherlands].

National Occupational Information Coordinating Committee. (1991). *Workers and workplaces: Diversity, challenge, excellence!* Highlights of The Annual National State Occupation Information Coordinating Committee Conference. Washington, DC: Author. ERIC Document Reproduction Service No. ED 344 001.

O'Neil, J. (Ed.). (1989). Global education. *ASCD Curriculum Update,* January.

Organisation for Economic Cooperation and Development. (Bimonthly). *OECD Observer.* Paris, France: Author.

Organisation for Economic Cooperation and Development. (Periodically). *Innovation in Education: News From the OECD - Paris.* [Director, Social Affairs, Manpower and Education, OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France].

The Premier's Council. (1990). *People and skills in the new global economy.* Toronto, Ontario, Canada: Queen's Printer, Ontario.

Pupils Attitude Towards Technology Foundation. (Periodically). *Tech-Ed-News.* Technology education newsletter. [Marc de Vries, HG 9.29 PO Box 513, Eindhoven University of Technology, 5600 MB Eindhoven, The Netherlands].

Pytlik, E. C., Gilberti, A. F., Hayden, M. A., Smalley, L., & Wiens, A. E. (1991, October). Development of a model course on technology as liberal arts. In P. H. Wright, *Technological impacts: Social, environmental, economic, ethical.* Proceedings of Technology Education Symposium XIII, Terre Haute, IN: Indiana State University, Industrial Technology Education Department.

Savage, E., & Sterry L. (Eds.). (1990). *A conceptual framework for technology education.* Reston, VA: International Technology Education Association. ERIC Document Reproduction Service No. ED 334 463.

Scarborough, J. D. (1991). International perspectives on technological literacy. In Dyrenfurth, M. & Kozak, M. (Eds.), *Technological literacy.* 40tieth Council on Technology Teacher Education. Peoria, IL: Glencoe.

Schwaller, A. (1988). *Technology: An International Perspective.* Proceedings of the Technology Education Symposium X, St. Cloud, Minnesota, October 20-22, 1988.

Sifuna, D. N. (1992). Diversifying the secondary school curriculum: The African experience. *International Review of Education, 38*(1), 5-18.

Smith, J. (Ed.) (1990-1992). *Conference proceedings: National Conference Design and Technology Educational Research and Curriculum Development.* September 13-15, 1990, Loughborough, UK: Department of Design and Technology, Loughborough University of Technology.

Snyder, T. D., & Hoffman, C. M. (1991). *Digest of education statistics, 1991*. Washington, DC: National Center for Education Statistics. ERIC Document Reproduction Service No. ED 340 141.

Technology Education Development Unit. (Three issues annually). *Design and technology TIMES*. Salford, England: University of Salford.

Tedesco, A. J. (1991). *Technology transfer*. Paper presented at the Annual Meeting of the International Vocational Education and Training Association, Los Angeles, CA. ERIC Document Reproduction Service No. ED 342 891.

UNESCO Institute for Education. (Eds.). (Quarterly). *International review of education*. Hamburg, Germany: Author.

UNESCO. (1987). *Comparative study on the national science and technology policy-making bodies in the countries of Eastern and Southern Africa*. Monograph #66. Paris, France: Author.

UNESCO. (Monthly). *The Unesco Courier*. Paris, France: UNESCO.

UNESCO. (Quarterly). *Prospects*. (Considers education in all its socio-economic and cultural contexts.) Paris, France: UNESCO.

Waetjen, W. B. (1989). *Technological problem solving: A proposal*. Reston, VA: International Technology Education Association. ERIC Document Reproduction Service No. ED 334 464.

Wicklein, R., Hammer, D., Balistreri, J., DeVore, P., Scherr, S., Boudreau, W., & Wright, J. (1991). Technology education demonstration projects: Multidisciplinary approaches to technology. *The Technology Teacher, 51*(3), 3-8.

Williams, P. J. (1989). Internationally appropriate technology education: A model. *Journal of Epsilon Pi Tau, 15*(2), 12-18.

Wolf, A. (1991). Assessment in European vocational education and training: Current concerns and trends. *Journal of Curriculum Studies, 23*(6), 552-57. ERIC Document Reproduction Service No. EJ 443 731.

Wright, J. R. (Ed.). (1991). *The essential elements of a quality graduate technology education program*. CTTE Monograph No. 12. Reston, VA: Council on Technology Teacher Education.

World Council of Associations for Technology Education

Discussion Draft, Weimar, April 30, 1992

Mission

WOCATE's mission shall be to promote technological literacy for all people through the facilitation of communication, encouragement of cooperation, and the development of technology education throughout the World.

Goals

The goals of WOCATE are to focus international efforts towards:

- the enhancement of the quality of technology education
- recognition of technology's diverse nature and the importance of the interface between technology and the natural world
- establishment of Technology Education as a priority area of learning
- establishment of the right of all persons to participate in Technology education
- enhancement of communication among Technology Educators throughout the world
- clarification of the interface between technology education and other discipline areas
- recognition of the role of Technology Education in life-long learning, and
- the promotion of research.

Realization

WOCATE is an umbrella organization for the world's Technology Education associations. The organization's goals shall be realized by the development of an organizational structure, policies, and a program of work that encourages and facilitates:

- liaison with key international agencies
- establishment of networks
- sharing and dissemination of information
- identification of emerging needs, and
- research into Technology Education, its nature and interface with other disciplines, society, industry, economics and the environment.

Sample associations operating in the internationalization arena (draft list)

Alberta Teachers' Association (Technology Education Council)
828 Woodpark Way SW, Calgary, T2W 2V8, Alberta, Canada

Alliance for Education in Global and International Studies
c/o ASCD, 125 N. West Street, Alexandria, VA 22314-2798

Associacion de Dirigentes de Capacitacion, Rincon 226 1 D (1081), Buenos Aires, Argentina

The American Forum: Global perspectives in education
45 John St., Suite 1200, New York, NY 10038

Association for Teacher Education in Europe, c/o Francine Vaniscotte
c/o Center national de Formation Permanente des Formateurs d'instituteurs, Ecole Normale, 45 Avenue des Etats-uni, F-78000, Versailles, France

Association Jeunes Sciences de Tunisie
Avenue de la Liberte, 105 Tunis, Tunisia

Association of Polish Educators, c/o prof. Dr. Habil. Paed. Stanislaw Kaczor
Noakowskiego 6, 00-666 Warszawa, Poland

Association of Science and Technology Teachers, SNPPiT
Skrytka Pocztowa 62, 85-791 Bydgoszcz 32, Poland

Canadian Vocational Association, c/o Peter Gwan
Ottawa, Canada

Canadian Learned Society (Has a technology education subsection)

China Association for Science & Technology, c/o Cheng Donghong
Dept. of Children & Youth Affairs, 54, Sanlihelu, Beijing, 100863
Peoples' Republic of China

Commission of Experts for Technological Education in Poland
c/o Prof. Dr. Habil. Ing. Kazimierz Uzdzicki, Chairman, Wyzsza Szkola Pedagogiczna
al. Wojska Polskiego 69, Zielona Góra 65-625, Poland

Committee on Science and Technology in Developing Countries (COSTED),
Central Secretariat, 24, Gandhi Mandap Road, Madras 600 025, INDI. Also COSTED has Latin American Regional Office (IDEA) apartado 17606, Parque Central Caracas 1015A, Venezuela

Commonwealth Association Science, Technology & Mathematics Educators (CASTME)
c/o Dr. Maurice Goldsmith 5 Ladywell Court, East Heath Road, London NW3 1AH

Comparative Education Society in Europe (ISFE)
Palazzina delgi Uffici, Via Roma 8, Gardene Riviera (Brescia), Italy

DATA, The Design & Technology Association, c/o Gordon Warren, Director
16 Wellesbourne House, Walton Road, Wellesbourne
Warwickshire CV35 JB, United Kingdom

DESTECH c/o A. Corbridge
United Kingdom

Deutscher Philologenverband e.V. Bayerischer Philologenverband, c/o Heinz Durner
Arbeitskreis Gymnasium/Wirtschaft (AGW)
Implerstrasse 25 a, 8000 München 70, Germany

European Society for Technology Education (EGTB)
Postfach 10 11 39, Graf-Recke Strasse 84 (VDI Haus), D-4000 Düsseldorf-Düsseltal 1
Germany

French Association AFPA
B.P. 18, St. Etienne · Rou Vaay, 76800 France

Fundacion Empresarial Para El Desarrollo Educativo
VIP 162, P.O. Box 52-0656, El Salvador

Gesellschaft für Arbeit, Technik und Wirtschaft im Unterricht e.V.
c/o Professor H. Sellin, President, Postfach 2503, 2900 Oldenburg, Germany

GIFOP INEURA Association
15 rue des Freres Lumiere, B.P. No. 1227, 68054 Mulhouse Cedex, France

Hungarian Association for Research on History in Technology Education
c/o Dr. Ervin Szücs, Eötvös University, Faculty of Sciences
Department of School Technology Education
Rákóczi ut 5., Budapest H-1088, Hungary

International Council of Associations for Science Education, c/o Dennis Chisman,
ICASE Honorary Treasurer, Knapp Hill, South Harting, Petersfield GU31 5LR
United Kingdom

International Council of Scientific Unions

International Design & Technology Education Conference Series, c/o John Sowerby
Scottish Consultative Council on the Curriculum, 17 St John Street
Edinburgh EH8 8DG, Scotland

International Federation of Training & Development Organisations
c/o Ken Gardner, Honorary Secretary, 22 Sappperton
Glos GL7 6LQ, United Kingdom

International Organization for Science and Technology Education

International Society for Engineering Education
c/o Prof. A. Melizenek

International Vocational Education & Training Association, c/o Joel Magisos
P.O. Box 954, Powell, OH 43210, USA

N. Yorkshire Schools and Industry Association, c/o C. Briant
Park Grove School, Dudley Street, York, YO3 7LG, United Kingdom

National Association of Advisers & Inspectors for Design & Technology
c/o Omry Bailey, Cheshire County Council, Education Professional Services
County Hall, Chester CH1 1SQ, United Kingdom

Philippine Society for Training and Development
Room 400, National Life Building, Ayala Avenue, Makati, Metro Manila, Philippines

Physics Teacher Association (Students at age 16-19)
Slotsgade 2,3, DK-2200 Copenhagen, Denmark

Pupils Attitude Towards Technology, c/o Dr. Marc de Vries
HG 9.29 PO Box 513, Eindhoven University of Technology, 5600 MB Eindhoven
The Netherlands

Saprogex
17 Rte De la Reine, 92100 Boulogne Billancourt, France

Scotland Technology Teachers Association c/o James Johnston
Spring Burn Academy, 50 Mansel Street, Glasgow G21, Scotland

Stanford Program on International/Cross Cultural Education
Institute of International Studies, Littlefield Center, Room 14, Stanford, CA 94305-5013

Union of Teachers of Technology Education (Founding), c/o Frantisek Mosna
Charles University, The Faculty of Education, M.D. Rettigove 4
Prague 0042, Czechoslovakia

Verband der Lehrer für Arbeit-Wirtschaft-Technik Thüringens e.V.
Gymnasium Bad Berka, Bad Berka, Germany

Sample agencies operating in the internationalization arena (draft list)

CEDEFOP, European Center for the Development of Vocational Training, Bundesallee 22, D-1000 Berlin 15, Germany.

CINTERFOR

COMETT

Commission of the European Communities

Commonwealth Secretariat, Marlborough House, Pall Mall, London SW1Y 5XH, United Kingdom

EuroTecNet

Ford Foundation

Institute of International Education (IIE), 809 United Nations Plaza, NYC 10017

International Labor Organization, Geneva, Switzerland

NATO (Advanced study institutes, advanced research workshops, collaborative research grants)

OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France

Organization of American States, Washington, D.C.

The Council for International Exchange of Scholars (CIES)

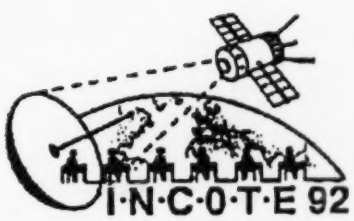
The International Research & Exchanges Board (IREX), 655 third Avenue, NYC 10017.

UNESCO, Paris, France

UNESCO Institute for Education, Hamburg, Germany

United States Information Agency (USIA), Washington, D.C.

USAID, GTZ, CIDA...(national international aid agencies)



International Conference on
Technology Education

April 1992
Weimar Germany

Technological Literacy, Competence and Innovation in Human Resource Development: Proceedings of the First International Conference on Technology Education

Editors: Prof. Dr. Dietrich Blandow & Prof. Dr. Michael Dyrenfurth

Sponsor: Technical Foundation of America

INCOTE-92 Proceedings Order Form

To order additional copies of these conference proceedings, complete a copy of this form and mail it, together with a cashable remittance of $35.00* US (or 52.00 DM) for each Proceedings volume ordered, to either of the two addresses indicated below:

Please send _____ (number of Proceedings) at $35.00 each to:

Name: _____ Date: _____

Mailing address: _____

_____ Country: _____

_____

Telephone: _____

Fax: _____

Enclosed is $_____ (in US$ or DM) for ____ copies of the INCOTE-92 Proceedings. Mail order to:

Applied Expertise Associates c/o

Professor Dietrich Blandow
28 Brühler Herrenberg
O-5023 Erfurt
Germany

Professor Michael Dyrenfurth
338 Crown Point
Columbia, MO 65203
USA

* Quantity prices are available for orders of more than 5 Proceedings. Please contact the editors [at the above address, Fax USA 314-874-0662] for details.